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10/799,325	03/12/2004	Randy L. Hoffman	200315134-1	8192

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EXAMINER

TRAN, THIEN F

ART UNIT	PAPER NUMBER
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2811

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/799,325
Filing Date: March 12, 2004
Appellant(s): HOFFMAN, RANDY L.

Edward J. Brooks III
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 09/21/2006 appealing from the Office action mailed 06/13/2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The following are the related appeals, interferences, and judicial proceedings known to the examiner which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal:

The related application number 10/799,838 is presently under appeal. The application was filed on March 12, 2004, with the title "Semiconductor Device". The first listed inventor is Randy L. Hoffman. The Primary Examiner is Long Pham of Art Unit 2814.

The related application number 10/799,961 is presently under appeal. The application was filed on March 12, 2004, with the title "Semiconductor Device". The first listed inventor is Randy L. Hoffman. The Primary Examiner is William F. Kraig of Art Unit 2815.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows:

The title of Ueda et al. (reference 7R) is "Synthesis and control of conductivity of ultraviolet transmitting β -Ga₂O₃ single crystals".

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,744,864	Cillessen et al.	04-1998
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Ueda et al. "Synthesis and control of conductivity of ultraviolet transmitting β -Ga₂O₃ single crystals single crystals" Appl. Phys. Lett., Vol. 70, No. 21 (June 30, 1997), pp. 3561-3563

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3, 7-9, 11, 14, 28-30, 34, 36 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cillessen et al. (US 5,744,864) in view of Ueda et al. (reference 7R, sheet 7 of 1449 submitted 03/12/2004) (Synthesis and control of conductivity of ultraviolet transmitting β -Ga₂O₃ single crystals single crystals).

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Cillessen et al. discloses a semiconductor device (1) of Figure 2 comprising an electrode (2) characterized as a drain electrode and an electrode (3) characterized as a source electrode; a channel (4) contacting the drain electrode and the source electrode, wherein the channel includes a gallium oxide, Ga_2O_3 (col. 5, lines 34-40); a gate electrode (5); and a gate dielectric (6) positioned between the gate electrode and the channel. Cillessen et al. does not explicitly disclose the gallium oxide (Ga_2O_3) being a single-phase crystalline form of $\beta\text{-Ga}_2\text{O}_3$ doped with Sn or N. Ueda discloses $\beta\text{-Ga}_2\text{O}_3$ single crystals doped with N or Sn as a transparent conducting oxide (page 3561, col. 2, lines 2-5, lines 16-17, line 39). It would have been obvious to a person having ordinary skill in the art at the time the invention was made to use the transparent conducting oxide of single-phase crystalline form of $\beta\text{-Ga}_2\text{O}_3$ doped with N or Sn as taught by Ueda et al. for the gallium oxide in the channel (4) of Cillessen et al. in order to obtain transparency and higher conductivity.

Regarding claim 7, the channel (4) is positioned between and electrically coupling the drain electrode and the source electrode.

Regarding claims 8, 14 and 40, at least one of the drain electrode, the source electrode, the channel, and gate electrode, and the gate dielectric are substantially transparent.

Regarding claims 28-30, the claim limitations "providing a precursor composition including one or more compounds of a gallium precursor compound" and "depositing a channel of gallium oxide from the precursor composition" in claim 28, "depositing the channel includes: vaporizing the precursor composition to form vaporized precursor

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composition; and depositing the vaporized precursor composition using a physical vapor deposition technique” in claim 29, “the physical vapor deposition technique includes one or more of dc sputtering, rf sputtering, magnetron sputtering, and ion beam sputtering” in claim 30 are taken to be product by process limitations. A product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See In re Fessman, 180 USPQ 324, 326 (CCPA 1974); In re Marosi et al., 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product “gleaned” from the process steps, which must be determined in a “product by process” claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

Regarding claim 34, Cillessen et al. further discloses a plurality of display elements (30), where each of the display elements includes a semiconductor device (1). (see Figures 8-10).

(10) Response to Argument

With respect to claims 1, 7-9, 14, 34 and 40, appellant asserts that Ueda reference does not disclose using Sn in an oxide with Ga as a dopant. It is noted that the reference titled “Anisotropy of electrical and optical properties in β -Ga₂O₃ single crystals” (reference 7Q) is not the prior art of record used in the final office action mailed date 06/13/2006. It is the Ueda et al. (reference 7R) titled “Synthesis and control of conductivity of ultraviolet transmitting β -Ga₂O₃ single crystals” upon which the examiner

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relies for the final rejection of the claims in combination with the Cillessen reference. Appellant errs by citing a different reference (reference 7Q) instead of the applied prior art (reference 7R) which the examiner relies on in the final office action that clearly teaches Sn-doped β -Ga₂O₃. Reference 7R also discloses using nitrogen during the crystal growth (page 3561, col. 2, lines 16-17).

With respect to claims 3, 11 and 36, appellant has the same arguments that the prior art does not teach β -Ga₂O₃ with dopant selected from a group consisting of oxygen vacancies (Si, Ge, Sn, and N). The examiner respectfully disagrees with the remark because the applied prior art Ueda et al. (reference 7R) clearly discloses β -Ga₂O₃ single crystals doped with N or Sn as a transparent conducting oxide (page 3561, col. 2, lines 2-5, lines 16-17, line 39).

With respect to claim 28-30, appellant also cites the wrong reference (reference 7Q) to argue that Ueda does not teach β -Ga₂O₃ with dopant selected from a group consisting of oxygen vacancies (Si, Ge, Sn, and N) and asserts that the final product is not made obvious by Cillessen and Ueda. It is quite clear that appellant relies on the wrong evidence to argue that the combined teachings of Cillessen and reference 7R do not teach the claimed product.

In conclusion, Appellant by citing a different reference (reference 7Q) against the claims does not provide convincing evidence or arguments that the applied prior art (reference 7R) does not teach β -Ga₂O₃ with dopant selected from a group consisting of oxygen vacancies (Si, Ge, Sn, and N) in combination with Cillessen. Applicant fails to rely on the applied prior art (reference 7R) and discuss the references (reference 7R

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and Cillessen) applied against the claims, explaining how the claims avoid the references or distinguish from them.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

tt

November 29, 2006

Conferees:

Thien Tran TT

Richard Elms

Darren Schuberg

Thien Tran
THIEN TRAN
PRIMARY EXAMINER

[Signature]
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